

The Role of Surface chemistry and Doping in High Performance Nanocrystal Electronics

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Inorganic colloidal nanocrystals(NCs) are attractive for their benefits of inorganic superior properties with size-tunable electronic properties. The artificial solid constructed from various NC building blocks that retain the unique size tunable properties while exhibiting the high carrier mobilities and conductivities characteristic of bulk semiconductors. Recently, we have addressed solution processed high mobility CdSe NC based FETs. To form high mobility CdSe NC semiconducting channel for FETs, we combined solution-exchange of the long ligands used in synthesis with the compact SCN- ligand, to allow for strong NC coupling, with diffusion of elemental In, to electronically passivate and dope the NC channel. In this presentation, we will discuss 1) how surface chemistry and doping can enhance electronic transport in NC solids and 2) how different types of NCs can be utilized as promising components for the low-cost, large-area fabrication of nanocrystal device technologies.